

Work Order ID 142088

Wednesday, February 24, 2016 11:26:43 AM

142088**U/R**

Page 1

Item ID: D412-596-203

Accept

N900040100

Setup Start

NS1

Revision ID: URF 14-644, URF 15-561

Stop

NS2

Item Name: Stainless Steel Aft Crosstube - Extended Height 39"

Start Date: ~~2/24/2016~~ 3/21/2016 Start Qty: 1.00***1***

Cust Item ID:

Required Date: ~~3/11/2016~~ 4/08/2016 Req'd Qty: 1.00***1***

Customer:

Reference: 4/08/2016

Approvals: Process Plan: MLJ Date: FEB 24 2016

Tooling:

Date:

Run

Start

NR1

QC: _____ Date: _____ SPC (Y/N): _____

Date:

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr
D412-596-203	B U/K OK 16/3/15

100

Document Control

0.00

100

DOCUMENT CONTROL

DC

Memo

0.00

Doc.Control -USB or Paperwork

Photocopy bluefile & type labels per BPP0412-596-203 CHG001

110

BENDING MACHINE - CROSSTUBES

0.00

110

CNC Bend 2

Memo

0.05

CNC Alpha 160 Bender

Bend tube as per Dwg D412-596-203 using CNC bender program _____ and Folio FT _____

****USE (4) DT9824 SHIM BLOC TO CHECK STRAIGHTNESS****

127

QC15- Crosstube Dimensional Check

0.00

127

QC

Memo

0.00

Quality Control

MARK CUT LINES

P.T.O.

11
12
13
14

2017

DQA: dwt Date: 16.08.09QA Closed: RPM Date: 16/07/20 **WORK ORDER NON-CONFORMANCE / UPDATE**Work Order update only ☐

Work Order: <u>142088</u> Part No. <u>D412-596-203</u> NCR No. <u>16-5928</u>	DISPOSITION Rework ☐ Scrap ☒ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS <table style="width:100%;"> <tr> <td>Skid-tube ☐</td> <td>Cross tube ☒</td> <td>Water Jet ☐</td> <td>Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>				Skid-tube ☐	Cross tube ☒	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
Skid-tube ☐	Cross tube ☒	Water Jet ☐	Engineering ☐																		
Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐																		
Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐																		
Large Fab ☐	Composite ☐	Supplier ☐																			
Date: <u>16-04-14</u>	Step #: <u>110</u>	QTY Effective: <u>1</u>	MRR (QSI042) Approval <u>28</u> <u>029</u> <u>16.07.13</u>																		
Description Work Order Deviation		Disposition		Completed By																	
1/2 span is 59.187 should be a min. of 59.56. And angle ϕ is 55.8° and should be max. of 52° (see attach picture) R.C. process/mol.		SCRAP 16/4/14 6553°		<u>TV</u> <u>16.07.14</u>																	
				Lead hand / Supervisor Approval Verification																	
				PD <u>16.07.13</u> QC / QA Coordinator Approval																	
PD <u>16.07.13</u>																					

Root Cause				FAULT CATEGORY			
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐		
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐		
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	☒ Over/Under tolerance		
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐		
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐		
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐		
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐		
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐		
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐		
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐		
Past Expiry Date ☐	☒ Manufacturing Process						
Misidentified ☐	Past Due ☐	OTHER :					

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142088

N900040100

Setup Start *NS1*

Stop *NS2*

Start Date: 2/24/2016 **Start Qty:** 1.00 ***1***

Cust Item ID:

Required Date: 3/11/2016 **Req'd Qty:** 1.00 ***1***

Customer:

Reference:

Run Start *NR1*

Approvals: _____ **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

Stop *NR2*

OC: _____ Date: _____ SPC (Y/N): _____ Date: _____

[illegible]

142088

Page 3

N900040100

Setup Start *NS1*

Stop ***NS2***

Stop ***NS2***

1

*** 1 ***

Run Start *NR1*

Stop *NR2*

Stop *NR2*

174	Outsource process - NDT per QSI038 4.1	0.00
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[illegible]

Outsource process - NDT

176

Packaging	Memo	0.00
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Packaging

178	QC5- Inspect part completeness to step on W/O	0.00
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178

QC	Memo	0.00
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Quality Control

Work Order ID 142088

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Item ID: D412-596-203 Accept ***N900040100*** Setup Start ***NS1***
Revision ID: URF 14-644, URF 15-561 Stop ***NS2***
Item Name: Stainless Steel Aft Crosstube - Extended Height 39"
Start Date: 2/24/2016 Start Qty: 1.00 ***1*** Cust Item ID:
Required Date: 3/11/2016 Req'd Qty: 1.00 ***1*** Customer:
Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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200

0.00

200

Crosstubes

0.03

Crosstubes

Memo

1- Install center support using scoth-weld DP460 per QSI 015, as per DWG. note 12.

A/R scoth-weld DP460 BATCH #: _____

2- Install clamp with rubber cushion as per DWG. note 13

3- Abrade mating surfaces of support and crosstube with 400 grit sandpaper, clean the area with 4105S wash 'n' wipe

4- **IF NOT ALREADY PRESENT ON CHAFFING SHEILD.** Apply a thin coat of proseal 890 per QSI 015 on inside concave surface of chafing shield and let cure per manufacturer's instructions. Install prosealed chafing shield onto crosstube by applying a thin coat of proseal 890 onto crosstube. Be sure to eliminate any air gaps.

A/R Proseal 890 Batch: _____

5- Install supports clamps using DT _____ as per Dwg D412-596-203, Torque clamps on support to 80-100 IN-LBS. Torque clamps on chafing shield to 40-50 IN-LBS.

START CURE TIME: _____ FINISH CURE
TIME: _____

PRIOR TO PACKAGING RE-CHECK TORQUE ON CLAMPS AFTER
CURED FOR 24H.

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Wednesday, February 24, 2016 11:26:43 AM

Item ID: D412-596-203 Accept ***N900040100*** Setup Start ***NS1***
Revision ID: URF 14-644, URF 15-561 Stop ***NS2***
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Start Date: 2/24/2016 Start Qty: 1.00 ***1*** Cust Item ID:
Required Date: 3/11/2016 Req'd Qty: 1.00 ***1*** Customer:
Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210 *210* QC Quality Control	QC5- Inspect part completeness to step on W/O Memo PRIOR TO PACKAGING RE-CHECK TORQUE ON CLAMPS AFTER CURED FOR 24H.	0.00 0.00							
240 *240* Packaging Packaging	Packaging Memo Identify and pack for shipping as per PPPD412-596-203 Location: _____ PPP Rev: _____	0.00 0.00							
250 *250* QC Quality Control	QC21- Final Inspection - Work Order Release Memo	0.00 0.00							

SA 7/14/16. ϕ

Picklist Print

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Page 1

Work Order ID: 142088

142088

Parent Item: D412-596-203

D412-596-203

Parent Item Name: Stainless Steel Aft Crosstube - Extended Height 39"

Start Date: 2/24/2016

Required Date: 3/11/2016

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP REV:A NEW ISSUE JFS 13/03/22 VERIFY BY:DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D3595-063-530		Manufactured	No				Each	38.0000		2			

D3595-063-530

Rubber Cushion 0.63" wide x 5.30" Long

Location	Loc Qty	Loc Code
FG	1	
82656	1	
LG051	1	
132515	1	
LG052	36	
138921	36	

D4909-1

Manufactured No

Each 9.0000

1

D4909-1

Support

Location	Loc Qty	Loc Code
LG053	9	
135507	5	
140154	4	

D4910-1

Manufactured No

Each 17.0000

2

D4910-1

Chaffing Shield

Location	Loc Qty	Loc Code
LG053	17	
139520	8	
141315	9	

Picklist Print

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Page 2

Work Order ID: 142088

142088

Parent Item: D412-596-203

D412-596-203

Parent Item Name: Stainless Steel Aft Crosstube - Extended Height 39"

Start Date: 2/24/2016

Required Date: 3/11/2016

Start Qty: 1.00

Required Qty: 1.00

MS21920-26

Purchased

No

Each

27.0000

4

MS21920-26

Clamp

Location

Loc Qty

Loc Code

LG057

27

M132045

1

M133234

2

M133483

4

M133577

20

MS21920-28

Purchased

No

Each

92.0000

2

MS21920-28

Clamp

Location

Loc Qty

Loc Code

FG

1

105884

1

LG051

1

M132169

1

LG057

90

M130400

50

M133090

2

M134130

38

D412-596-203TRN

Manufactured

No

110

Each

4.0000

1

1

D412-596-203TRN

Crosstube Aft Extended Turning Detail

Location

Loc Qty

Loc Code

LG003

4

135132

1

135133

1

135134

1

135135

1

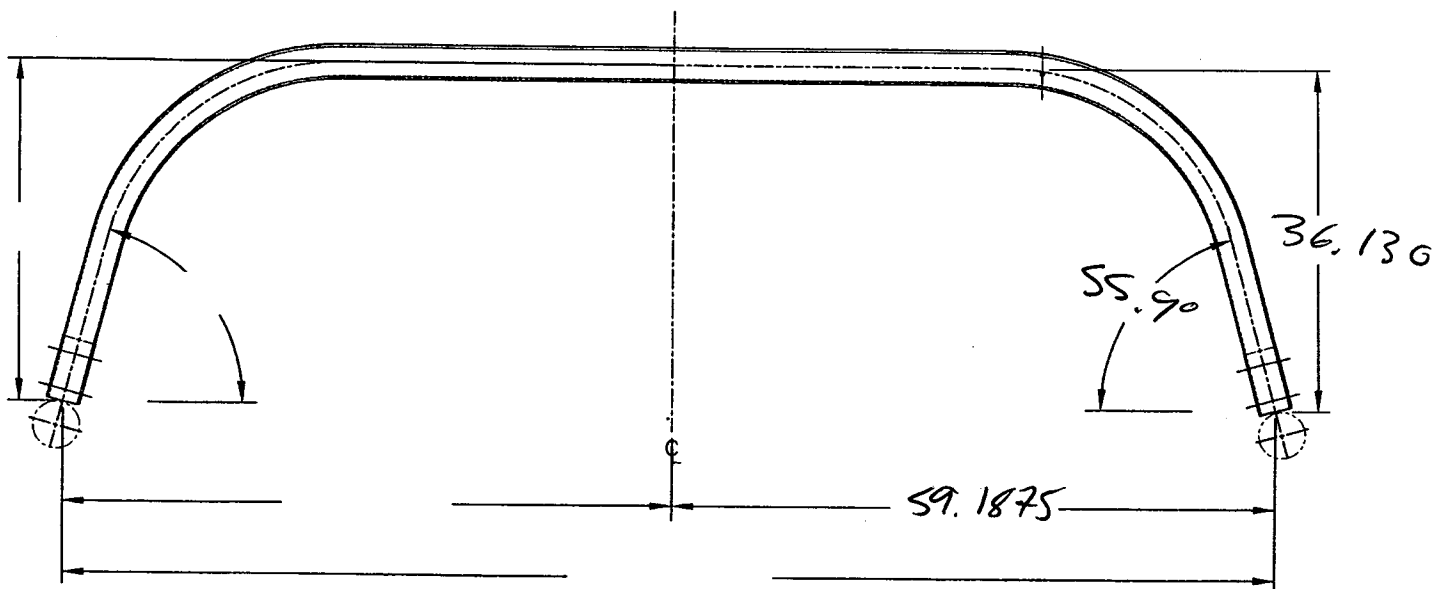
Wednesday, February 24, 2016 11:26:47 AM

Shop Packet Print

Page 2

DART AEROSPACE LTD		Work Order: 142088
Description:		Part Number:
Inspection Dwg:	Rev:	Page 1 of 1

Required Dimension	Min	Max
Height	35.63	36.13
1/2 Span	57.56	59.82
Angle	49°	52°
Total Span		
Bending Passes		
Crushing		



	Side A	Side B
Bending Passes		6
Crushing		
Comments		

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A		New Issue		
B	06.09.19	Reformat; QC level revised	KJ/JM	
C	07.02.06	Reformat	KJ/JM	
D	12.02.15	Added bending passes and crushing	KJ	
E	12.03.07	Revised comments table	KJ	

Item	Qty -203	Part Number	Description
1	X	D412-598-203	CROSSTUBE ASSEMBLY (412 HI HI AFT)
2	1	D8020-170	CROSSTUBE MATERIAL
3	2	D3595-063-530	RUBBER CUSHION
4	1	D4909-1	SUPPORT
5	2	D4910-1	CHAFING SHIELD
7	4	MS21920-26	CLAMP
8	2	MS21920-28	CLAMP
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
10	A/R	PROSEAL 890	SEALANT

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D8020-170
FINISHED LENGTH = 151.38±0.060 (BEFORE BENDING/TRIMMING)
- 2) FINISH: PRIME INSIDE AND OUTSIDE PER DART QSI 006 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN B8-2, HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, REMOVE MASKING AND APPLY MATTE CLEAR COAT PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART P/N "D412-598-203" AND B/N ON INSIDE OF CUFF PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 191.1 lb RAW MATERIAL, 118.3 lb AFTER MACHINING
118.0 lb FINISHED WEIGHT
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- BENDING**
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7% (BASED ON O.D.) IN LOWER HALF OF R35 BEND AND 8% (BASED ON O.D.) ON REMAINING TUBE.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038. TO BE PERFORMED AFTER FINAL POST-BEND GRINDING. ANY ADDITIONAL GRINDING REQUIRES ANOTHER LPI INSPECTION.

ASSEMBLY

- 12) INSTALL D4909-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015.
- 13) INSTALL MS21920-28 CLAMPS WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE D4909-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) IF NOT ALREADY PRESENT ON CHAFING SHIELD, APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D4910-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D4910-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- 15) TORQUE CLAMPS ON D4909-1 SUPPORT 80 TO 100 IN-LB. TORQUE CLAMPS ON D4910-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVES HAVE CURED FOR 24 HOURS.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT

WITHOUT NOTICE
WORK ORDER

NO. 142-088 ML5

1602-24

UNDER REVIEW OK
11/13/13
WRF 14-601
11/15/14

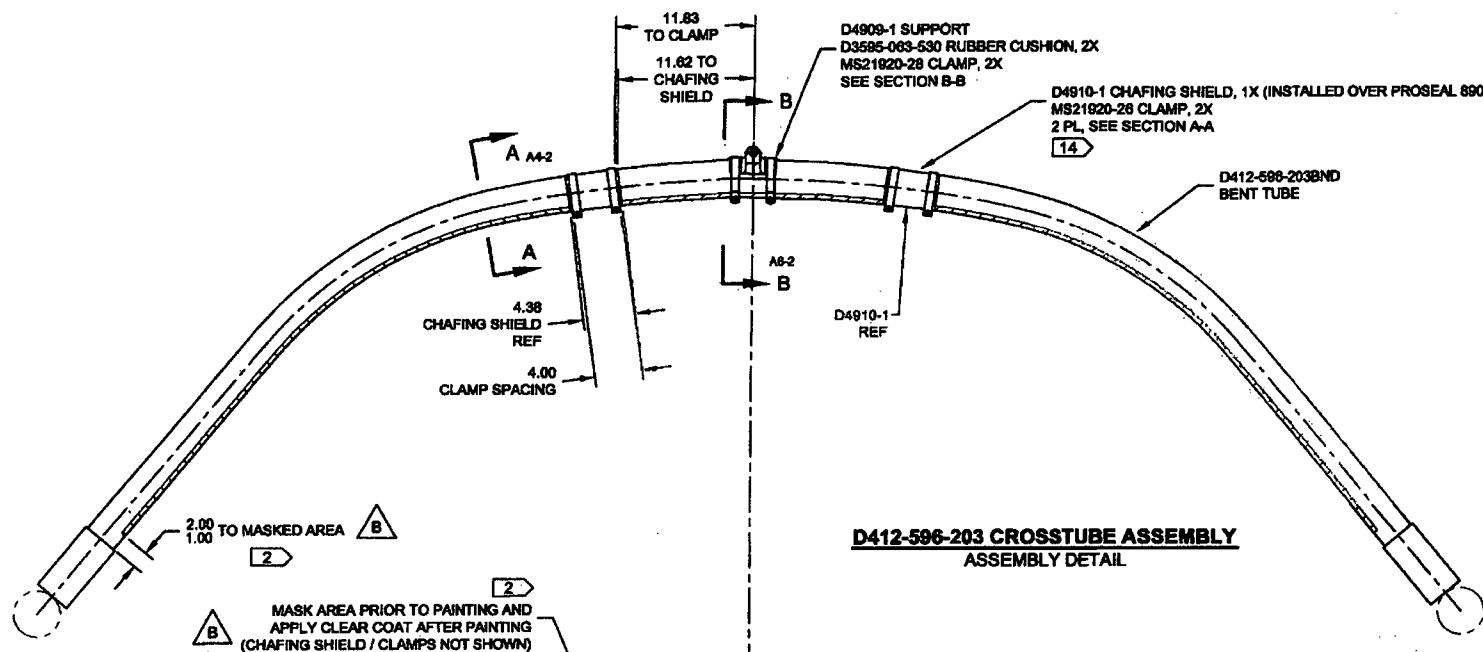
UNDER REVIEW

11/14/13
WRF 15-561

RELEASED
2013-08-06
WRF

B	ADD INSPECTION WINDOW (ZN C8-1, B8-2)	CP	13.08.16
A	NEW ISSUE	CP	13.03.13
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	13.06.16		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D412-598-203	REV. B SHEET 1 OF 4
TITLE CROSSTUBE ASSY (412 HI HI AFT)	SCALE NTS
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D412-596-203 CROSSTUBE ASSEMBLY
ASSEMBLY DETAIL

APPLY 3M SCOTCH-WEED DP480
BETWEEN D4909-1 SUPPORT AND
THE CROSSTUBE

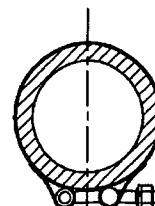
D4909-1
SUPPORT
REF

D3595-063-530
RUBBER CUSHION
UNDER CLAMP, REF

MS21920-28
CLAMP, REF

SECTION B-B D4-2
SCALE 4X

C
SYM



MS21920-28 CLAMP
REF

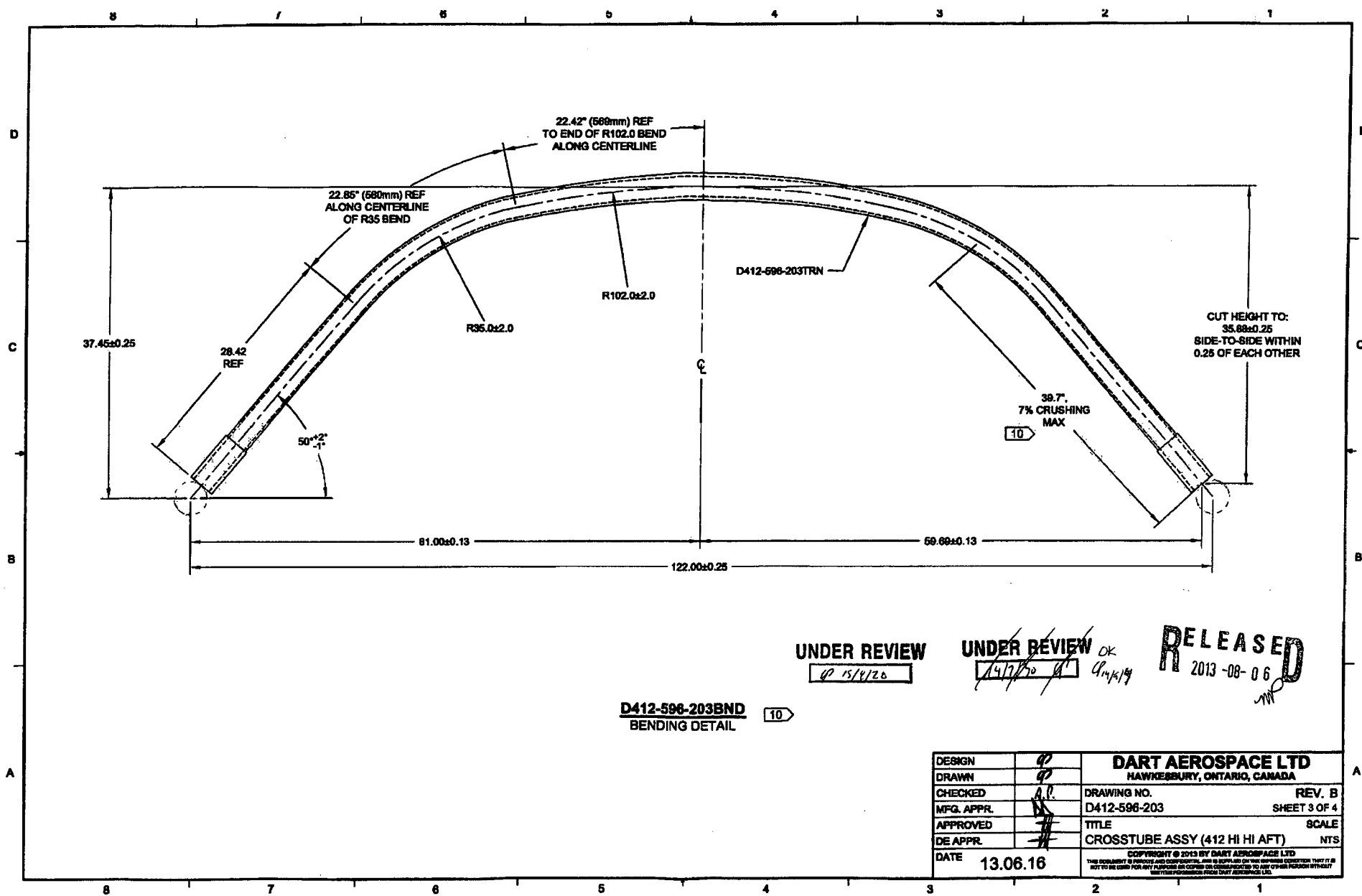
SECTION A-A C8-2
SCALE 4X

UNDER REVIEW

UNDER REVIEW

RELEASED
2013-08-06

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. B
MFG. APPR.		D412-596-203	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASSY (412 HI HI AFT)	NTS
DATE	13.06.16	COPYRIGHT © 2013 BY DART AEROSPACE LTD	



UNDER REVIEW

15/6/20

UNDER REVIEW

14/7/20

RELEASED
2013-08-06

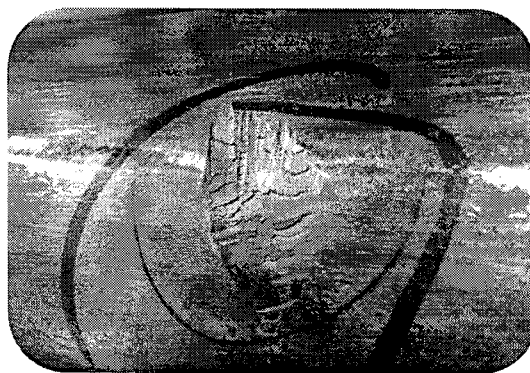
D412-596-203BND
BENDING DETAIL

10

DESIGN	40	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	40		
CHECKED	A.P.	DRAWING NO.	REV. B
MFG. APPR.		D412-596-203	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASSY (412 HI HI AFT)	NTS
DATE	13.06.16	COPYRIGHT © 2013 BY DART AEROSPACE LTD THIS DRAWING IS PRIVATE AND CONFIDENTIAL, AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR REPRODUCED IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION FROM DART AEROSPACE LTD.	



black line show where tube
should be



damage found during bending

AS Shown Above

Front facing = 0.276

UNDER = ~~0.265~~ 0.294

top/spine = 0.265

BACK = 0.275